Matlab Lab3:   *(Use m-file for the assignment)*

1. The distance a projectile travels when fired at an angle θ is a function of time and can be divided into horizontal and vertical distances.

$$H(t) = t\, V_o \cos(\theta)$$

$$V(t) = t\, V_o \sin(\theta) - 1/2\, g\, t^2$$

$H(t)$ and $V(t)$ are the distance traveled in x and y direction. V_o = 100 m/s is the initial velocity, g = 9.81 m/s^2 and t is the time, 0 <t < 20 sec.

Calculate the vertical (V1, V2 and V3) and horizontal (H1, H2, H3) distances traveled for angles $\pi/2$, $\pi/4$ and $\pi/6$. Graph horizontal distances in x-axis and vertical distances in y-axis for all three cases. You will have three lines, make one solid, one dashed and one dotted. Add a legend to identify which line is which.

2. Populations tend to expand as $P = P_o e^{rt}$, where P is the current population, P_o is the original population, r is the rate, expressed as a fraction, t is the time.

If you originally have 100 rabbits that breed at a rate of 9% per year, find how many rabbits you will have at the end of each year for 30 years. Create a plot with three subplots. In the first subplot plot t versus P on a rectangular coordinate system. In the second subplot plot t versus P, scaling the x-axis logarithmically. In the third subplot plot t versus P, scaling both axes logarithmically. Add title to each graph.

3. The vector G represents the distribution of final scores in a course.

G = [68, 70, 56, 78, 97, 65, 87, 84, 72, 90, 99, 85, 79, 96, 64, 88, 76]

(a) Use Matlab to sort the data and create a bar graph of the sorted scores. Add Title, and axis labels.

(b) Create a histogram of the scores. Add Title, and axis labels.

4. Create a vector of x values from 0 to 20π, with an increment of $\pi/100$.

$$y = x \sin(x) \quad \text{and} \quad z = x \cos(x)$$

(a) Create an *x-y* plot of *y*.

(b) Create a polar plot of *x* and *y*.

© Create a 3D line plot of *x, y* and *z*. Add title and labels to every graph.

5. The final grades in a class have 2 A's, 4 B's, 8 C's, 4 D's and 2 F's. Create a pie chart of this distribution. Add a legend of the grade names (A, B, C etc.). Use the menu text option to add a text box to each pie slice.